Cardiac Emergencies

Cardiac Compromise

- **Signs and Symptoms**
  - **Squeezing, dull pressure**
  - **sweating**
  - **dyspnea**
  - **Anxiety, irritability**
  - **Feeling of impending doom**
  - **Abnormal pulse**
  - **Abnormal blood pressure**
  - **Epigastric pain**
  - **–**

Emergency Medical Care

- **Initial Patient Assessment Review**
  - **Circulation - pulse absent**
    - **Medical patient >12 years old - CPR with AED**
    - **Medical patient < 12 years old or < 90 lbs. - CPR**

Emergency Medical Care

- **Responsive patient with a known history - cardiac**
  - **Perform initial assessment.**
  - **Perform focused history and physical exam.**
  - **Place patient in position of comfort.**

Emergency Medical Care

- **Cardiac**
  - **Complains of chest pain/discomfort.**
    - **Apply oxygen if not already done.**
    - **Assess baseline vital signs.**

Emergency Medical Care

- **Important questions to ask.**
  - **Onset**
  - **Provocation**
  - **Quality**
  - **Radiation**
  - **Severity**
  - **Time**

Emergency Medical Care

- **Has been prescribed nitroglycerin (NTG) and nitro is with the patient.**
  - **Blood pressure greater than 100 systolic**
    - **One dose, repeat in 3-5 minutes**
    - **maximum of three doses.**
    - **Reassess vital signs**
- **Blood pressure less than 100 systolic**

Emergency Medical Care

- **Does not have prescribed nitroglycerin (NTG) - continue with elements of focused assessment.**
- **Transport promptly**

Relationship to BLS

- **Not all chest pain patients become cardiac arrest patients.**
- **One Rescuer CPR - rarely done by EMT-Basics while on duty, may be done while partner is preparing equipment, or en route to facility.**
- **Two Rescuer CPR - learning outcomes of a Professional Rescuer CPR Course must be enhanced during an EMT-Basic course.**

Relationship to BLS

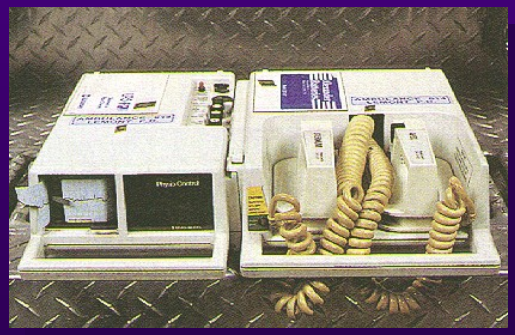
- **EMT-Basics must also learn:**
  - **Use of automated external defibrillation.**
  - **To request available ALS backup to continue the chain of survival when appropriate.**
  - **Use of bag-valve-mask**
  - **Use of flow restricted, oxygen-powered ventilatory devices.**

Relationship to BLS

- **EMT-Basics must also learn:**
  - **Techniques of lifting and moving patients.**
  - **Suctioning of airways.**
  - **Use of airway adjuncts.**
  - **Use of BSI**
  - **Interviewing bystanders/family.**

Automated External Defibrillation

- **Importance of AED to the EMT-Basic.**
  - **Fundamentals of early defibrillation**
    - **Chain of Survival.**
      - **Early access**
      - **Early CPR**
      - **Early defibrillation**
      - **Early ACLS**



Automated External Defibrillation

- **Rationale for early defibrillation**
  - **increased survival outcomes**
  - **increased survival was after early defibrillation programs were implemented and when all of the links in the chain of survival were present.**

Automated External Defibrillation

- Overview of automated external defibrillators
  - Types of automated external defibrillators
    - Fully automated - defibrillator operates without action by EMT-Basic
    - Semi-automated - defibrillator uses a computer voice synthesizer to advise EMT-Basic as to the steps to take

Automated External Defibrillation

- Analysis of cardiac rhythms
  - Defibrillator computer microprocessor evaluates the patient's rhythm and confirms the presence of a rhythm for which a shock is indicated.
  - Accuracy of devices in rhythm analysis has been high
  - Analysis is dependent on properly charged defibrillator batteries.

Automated External Defibrillation

- Inappropriate delivery of shocks
  - Human error
  - Mechanical error

Automated External Defibrillation

- Ventricular tachycardia
  - Attach defibrillator to only unresponsive, pulseless, nonbreathing patients to avoid delivering inappropriate shocks.
  - Defibrillator advises shocks for ventricular tachycardia when the rate exceeds a certain value, for example, above 180 beats per minute.

Automated External Defibrillation

- **Interruption of CPR**
  - **No CPR performed at times shocks are delivered.**
  - **No person should be touching patient during analysis and shocks.**

Automated External Defibrillation

- Interruption of CPR
  - CPR is stopped when the rhythm is being analyzed and when shocks are delivered.
  - Defibrillation is more effective than CPR
  - CPR may be stopped up to 90 seconds if three shocks are necessary.
  - Resume CPR only after up to the first three shocks are delivered.

Automated External Defibrillation

- Advantages of automated external defibrillation
  - Initial training and continuing education
    - Easier to learn than CPR, however, must memorize treatment sequence.
    - EMS delivery system should have:
      - Necessary links in chain of survival.
      - Medical direction.

Automated External Defibrillation

- **EMS delivery system should have:**
  - **EMS system with audit and/or quality improvement program in place.**
  - **Mandatory continuing education with skill competency review for EMS providers.**
- **Continuing competency skill review every three months for EMT-Basic.**

Automated External Defibrillation

- Speed of operation - first shock within one minute of arrival
  - Remote defibrillation through adhesive pads.
    - Defibrillation is "hands-off"
    - Safer method
    - Better electrode placement
    - Larger pad surface area
    - Less anxiety in EMT-Basic
- Rhythm monitoring - option on some defibrillators

Automated External Defibrillation

- Use of AED during resuscitation attempts.
  - Operational steps
    - BSI
    - Arrive on scene and perform initial assessment.
    - Stop CPR if in progress.
    - Verify pulselessness and apnea.
    - Have partner resume CPR.

Automated External Defibrillation

- Operational steps
  - Attach device.
  - Turn on defibrillator power.
  - Begin narrative if machine has tape recorder.
  - Stop CPR.
  - Clear patient.

Automated External Defibrillation

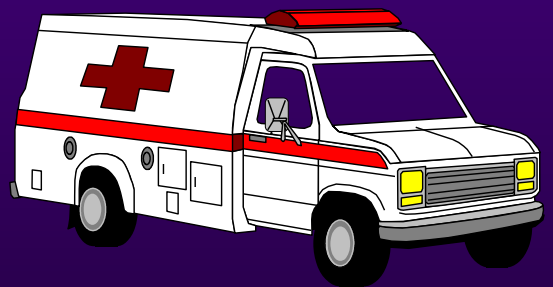
- Initiate analysis of rhythm.
  - Machine advises shock.
    - Deliver shock.
    - Re-analyze rhythm.
    - If machine advises shock, deliver second shock.
    - Re-analyze rhythm.
  - If machine advises shock, deliver third shock.

Automated External Defibrillation

- Check pulse.
  - If pulse, check breathing.
    - If breathing adequately, give high concentration O2 by nonrebreather mask and transport.
    - If not breathing adequately, artificially ventilate with high concentration O2 and transport.

Automated External Defibrillation

- If no pulse, resume CPR for one minute.
  - Repeat one cycle of up to three stacked shocks.
  - Transport.



Automated External Defibrillation

- If, after any rhythm analysis, the machine advises no shock, check pulse.
  - If pulse, check breathing.
    - If breathing adequately, give high concentration oxygen by nonrebreather mask and transport.
    - If not breathing adequately, artificially ventilate with high concentration oxygen and transport.

Automated External Defibrillation

- If no pulse, resume CPR for one minute.
  - Repeat rhythm analysis.
    - If shock advised, deliver if necessary up to two sets of three stacked shocks separated by one minute of CPR.
    - If no shock advised and no pulse, resume CPR for one minute.

Automated External Defibrillation

- Analyze rhythm third time.
  - If shock advised, deliver, if needed, up to two sets of three stacked shocks separated by one minute of CPR.
  - If no shock advised, resume CPR and transport.

Automated External Defibrillation

- Standard operational procedures
  - Assuming no on-scene ALS, the patient should be transported when one of the following occurs:
    - The patient regains a pulse.
    - Six shocks are delivered.
    - The machine gives three consecutive messages that no shock is advised.

Automated External Defibrillation

- Standard operational procedures
  - One EMT-Basic operates defibrillator, one does CPR.
  - Defibrillation comes first.
  - EMT-Basic must be familiar with device
  - Avoid patient contact during analysis of rhythm.
  - State "Clear the patient" before delivering shocks.
  - AED operates on batteries.

Automated External Defibrillation

- Age and weight guideline
  - Airway and artificial ventilation is of prime importance.
  - AED is not used in cardiac arrest in children under 12 years of age and less than 90 lbs.

Automated External Defibrillation

- Persistent ventricular fibrillation and no available ALS backup.
  - After six shocks on scene, prepare for transport.
  - Additional shocks may be delivered at the scene or en route if approved by local medical direction.
  - AEDs can not analyze rhythm when ambulance is in motion. Must stop vehicle in order to analyze rhythm
  - Not safe to shock in a moving ambulance.

Automated External Defibrillation

- Recurrent ventricular fibrillation
  - If en route with unconscious patient check pulse frequently. If pulse is not present then:
    - Stop vehicle.
    - Start CPR
    - Analyze rhythm.
    - Deliver shock.
    - Continue resuscitation.

Automated External Defibrillation

- If en route with conscious patient having chest pain who becomes unconscious, pulseless and apneic then:
  - Stop vehicle.
  - Start CPR.
  - Analyze rhythm.
  - Deliver up to 3 shocks, if indicated.
  - Continue resuscitation.

Automated External Defibrillation

- If "no shock" message is delivered and no pulse is present
  - Start or resume CPR.
  - Analyze rhythm until three consecutive "no shock" messages given or six shocks given or patient regains pulse.
  - Continue transport.

Automated External Defibrillation

- Single rescuer with an automated external defibrillator
  - Follow sequence
    - Initial assessment.
    - Assure pulselessness, apnea.
    - Turn on AED power.
    - Attach device.
    - Initiate analysis of rhythm.
    - Deliver shock if necessary.
    - Follow protocol.

Automated External Defibrillation

- **Defibrillation is initial step; CPR should not be performed prior to rhythm analysis.**
- **EMS system activation should not occur until "no shock indicated", pulse returns, three shocks are delivered, or help arrives.**

Automated External Defibrillation

- Pulse checks should not occur during rhythm analysis.
- Coordination of ALS personnel or EMT-Paramedics when EMT-Basics are using automated external defibrillators.
  - EMS system design establishes protocols.
  - AED usage does not require ALS on scene.

Automated External Defibrillation

- Coordination of ALS personnel or EMT-Paramedics when EMT-Basics are using automated external defibrillators
  - ALS should be notified of arrest events as soon as possible.
  - Considerations for EMT-Basic transporting the patient or waiting for ALS to arrive on the scene to transport should be in local protocols.

Automated External Defibrillation

- **Safety considerations**
  - **Water - rain**
  - **Metal**

Automated External Defibrillation

- Post resuscitation care
  - After AED protocol is completed, patient may:
    - Have pulses.
    - Have no pulse with machine indicating "no shock indicated."
    - Have no pulse with machine indicating shock.

Automated External Defibrillation

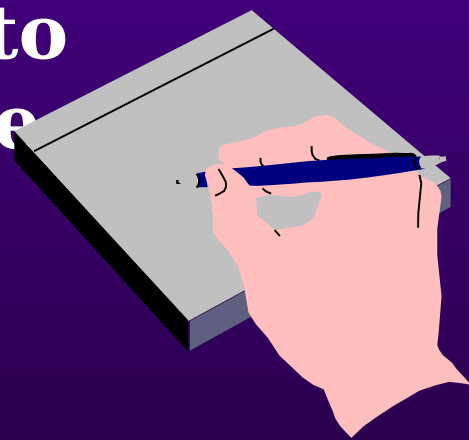
- If pulses return
  - Check airway .
  - Prepare for transport.
  - Consider awaiting ALS backup if appropriate.
  - Transport
  - Continue to keep defibrillator device on patient en route.
  - Perform focused assessment and reassess en route.

Automated External Defibrillation

- Defibrillator maintenance
  - Regular maintenance for AED is necessary.
  - Checklist for AED must be accomplished on a daily basis
  - AED failure is most frequently related to improper device maintenance, commonly battery failure.

Automated External Defibrillation

- Training and sources of information - the AHA publishes a variety of guidelines and additional information on AED.
- Maintenance of skills - most systems permit a maximum of 90 days between practice drills to reassess competency in usage AEDs.



Automated External Defibrillation

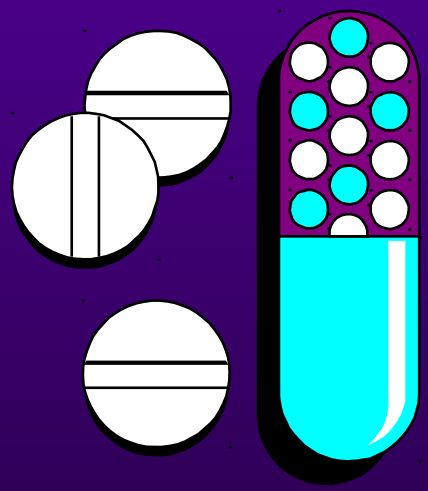
- **Medical direction**
  - **Completion of AED training in an EMT-B course does not permit usage of the device**
    - **State Laws**
    - **Local Medical Direction**
  - **Every event in which an AED is used must be reviewed by the medical director.**

Automated External Defibrillation

- Reviews of events using AEDs may be accomplished by:
  - Written report.
  - Review of voice-ECG tape recorders attached to AED's.
  - Solid-state memory modules and magnetic tape recordings stored in device.
- Quality improvement

Medications

- **Nitroglycerin**
  - **Medication name**
    - **Generic - nitroglycerin**
    - **Trade - Nitrostat**



Medications

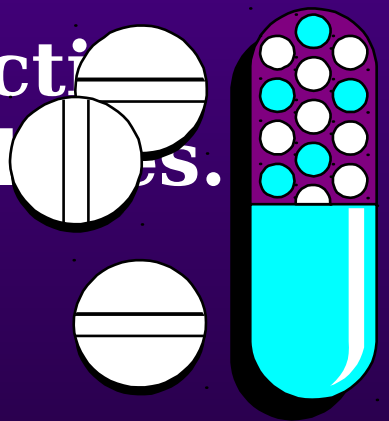
- Indications - must have all of the following criteria:
  - Signs and symptoms of chest pain,
  - Physician prescribed sublingual tablets, and
  - Specific authorization by medical dire

Medications

- **Contraindications**
  - **Hypotension or blood pressure below 100 mmHg systolic.**
  - **Head injury**
  - **Infants and children**
  - **Patient has already met maximum prescribed dose prior to EMT-Basic arrival.**

Medications

- Medication form - tablet, sub-lingual spray
- Dosage
  - One dose, repeat in 3-5 minutes if no relief,
  - BP > 100, and
  - Authorized by medical direction up to a maximum of three doses.



Medications

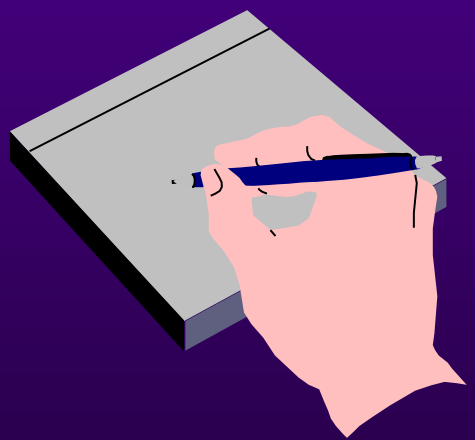
- **Administration**
  - **Obtain order from medical direction.**
  - **Perform focused assessment.**
  - **Take blood pressure - above 100 mmHg systolic.**
  - **Contact medical control if no standing orders.**

Medications

- Administration Cont.
  - Assure right medication, right patient, right route, patient alert.
  - Check expiration date.
  - Question patient
  - Ask patient to lift tongue and place tablet or spray dose under tongue (while wearing gloves) or have patient place tablet or spray under tongue.

Medications

- Administration Cont.
  - Have patient keep mouth closed with tablet under tongue (without swallowing) until dissolved and absorbed.
  - Recheck blood pressure within 2 minutes.
  - Record activity and time.
  - Perform reassessment.

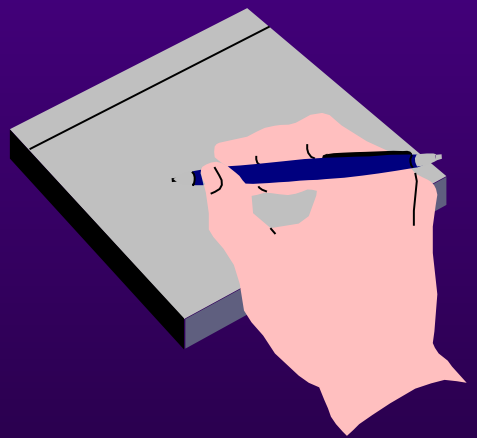


Medications

- **Actions**
  - **Relaxes blood vessels**
  - **Decreases workload of heart**
- **Side effects**
  - **Hypotension**
  - **Headache**
  - **Pulse rate changes**

Medications

- Reassessment strategies
  - Monitor blood pressure.
  - Ask patient about effect on pain relief.
  - Seek medical direction before re-administering.
  - Record reassessments.



Summary

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Emergency Medical Care
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